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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/534,503 | 03/24/2000 | Koji Tanizawa | AOY.003 | 2431 |

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EXAMINER

BAUMEISTER, BRADLEY W

ART UNIT PAPER NUMBER

2815

DATE MAILED: 11/06/2002

13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/534,503

Applicant(s)
Tanizawa

Examiner
B. William Baumeister

Art Unit
2815



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jul 30, 2002
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-20 and 35-44 is/are pending in the application.
- 4a) Of the above, claim(s) 11-20, 36, 37, and 43 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 35, 38-42, and 44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 8, 10 6) ☐ Other:

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DETAILED ACTION

Election/Restriction

1. Newly submitted claims 36, 37 and 43 are directed to inventions that are independent or distinct from the invention originally claimed for the following reasons:

a. Regarding claims 36 and 37, the claims as originally presented were directed towards (1) a light emitter having an n contact/active/p layer/p- layer/p+contact (subcombination B) (e.g., claim 1) and (2) this subcombination further in combination with a undoped/n-doped/undoped multilayer film (combination A_1B) (e.g., claim 8). Newly proposed claims 36 and 37 further set forth a second multilayer buffer film (element A_2), both layers of which may be undoped (claim 36) for the purpose of improving the crystallinity of the active layer (classified in class 257/190). As such, proposed claims 36 and 37 are directed towards new combinations, A_1A_2B and A_2B , respectively. Claims 35-37 evidence that inventions A_1B and A_2B are related as sub-combinations usable together, and that each invention has separate utility without the inclusion of the other combination element.

b. Regarding claim 43, the originally presented claims set forth that the low-doped p-layer has an Al concentration that is smaller than that of the p type (clad) layer (e.g., claims 2 and 3). Newly proposed claim 43 sets forth that the p- low doped layer is composed of AlGaN and that the p clad is composed of GaN (Al = 0). These inventions are related as species, since the layers have mutually exclusive (opposite) relationships.

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Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 36, 37 and 43 are withdrawn from consideration as being directed to non-elected inventions. See 37 CFR 1.142(b) and MPEP § 821.03.

Specification

2. The disclosure is objected to because of the following informalities: the specifications possesses various translational and idiomatic errors. For example:
 - a. Page 11, line 24: “undope [sic: undoped] layer”
 - b. “Reduced resistibility” is presumed to intend to read “reduced resistance.” (e.g. Page 39, line 21; page 41, line 8; page 42, line 14)
 - c. Various portions set forth “An another”: page 67, line 22; p. 68, l. 18; p. 69, l. 14; p. 70, l. 10; ...(and every page at least through)... page 82, line 23.
 - d. Page 76, line 7: “Two kind [sic: kinds] of another LED devices [sic: device] are manufactured...”
3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting these and any other errors in the specification of which applicant may become aware. Applicant has asserted that a substitute specification is being prepared, but no substitute specification has yet been received.

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Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 44 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification as originally filed discloses a p low-doped layer being composed of AlGa_N having an Al concentration within the range of 0 to 0.5, does not disclose that this layer may have an aluminum composition within the larger range of 0.5 to 1, as set forth in the claim.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 35 and 38-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. Claim 35 recites,

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“...a first n-region multi-film layer which has an undoped lower-film with an n-type impurity having a thickness within 100 angstroms - 500 angstroms, and an undoped upper film, said first n-region multi-film layer and said active layer...”

It is unclear what this limitation is intended to recite. For the purposes of examination, the examiner provisionally interprets the passage to intend to recite an undoped/n-doped/undoped structure similar to that of claim 36, but wherein the first undoped layer has the recited thickness of 100 - 500 angstroms.

Claim Rejections - 35 USC § 103

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Insofar as definite, claims 35, 38-42 and 44 are rejected under 35 U.S.C. 103(a) as obvious over JP 11-031841 (supplied by Applicants in IDS paper #2) in view of JP ‘175.

a. JP ‘841 discloses III-N semiconductor light emitters comprising a sapphire substrate 1; n-side contact 3; undoped GaN buffer 2 interposed therebetween (claim 41); InGaN MQW active layer 4; a first p-type layer 5; a second, low-doped layer 6; and a third highly doped p-contact layer 7, doped higher than the first p-type layer (see e.g., [Means for Solving the Problem] as well as other sections for examples of relative doping levels, e.g., [0010]-[0012]).

b. The first p-type layer may be composed of AlGaIn [0007] or of an (Al)GaIn multilayer superlattice having at least one layer doped [0010]. The reference gives examples of

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the respective layers' compositions as being $\text{Al}_x\text{Ga}_{1-x}\text{As}$ ($0 \leq x \leq 1$) for first p-layer 5 ([0007], [0010]); and GaN ($\text{Al} = 0$) for the second (low) and third (contact) layers 6, 7 [0007]. However, the reference is not so limited. Rather, it also states that it is preferable for the second and third layers to have the same composition [0011], and that it is preferable for the third layer to have an Al content of 0.3 or less [0012]. Therefore, the low doped p layer may also be composed of AlGaIn having a smaller Al concentration than the p clad 5.

c. Regarding claim 39, the reference states that the second layer may be composed of a multilayer superlattice [0011].

d. JP '841 discloses at least all of the claim limitations relating to the active and p-type layers, but it does not teach an n-region multilayer film having a first undoped layer of 100 - 500 Angstroms in thickness, a second, n-doped layer and a third, undoped layer, as set forth in independent claim 35. JP '175 teaches this structure as evidenced by Nagahama '382 which claims foreign priority to JP '175. (For ease of reference, the following discussion will refer to the Nagahama US patent which serves as an English translation, but the rejection is, in fact, made over JP '175 which published more than a year prior to the filing of the present application.)

e. Nagahama teaches n-type GaN-based superlattice clad layers that are formed on n-type contact layers. Each layer of the superlattice may have a thickness of 100 angstroms (e.g., col. 2, line 50). The superlattice may be modulation doped (i.e., only one of the alternating layers is doped, and the other layer is undoped) (e.g., col. 6, lines 40-45). In that multiple periods are disclosed, at least one of the n-type layers will be interposed between two undoped layers. Also,

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the compositions of the clad superlattice layers can be adjusted so that the clad reflects light emitted from the active layer (e.g., col. 10, lines 20-). The clad can have a total thickness of greater than 1.2 microns (e.g., col. 10, lines 40-), and the n-type contact 12 can have a thickness of 0.2 to 4 microns (e.g., col. 20, lines 15-).

f. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified an LED as taught by JP '841 so as to further include a superlattice clad as taught by JP '175 for the purposes of (1) providing greater carrier confinement to the active region due to the larger band-gap of the (Al)GaN superlattice, and (2) reflecting light towards the LED surface thereby increasing light emission for those applications in which surface emission (as opposed to rear-emission) is desired.

Response to Arguments

10. Applicant's arguments filed 7/30/2002 have been fully considered but they are either moot in light of the new grounds of rejection or are not persuasive for the reasons set forth hereinabove.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

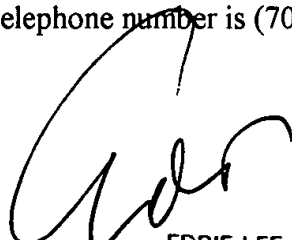
INFORMATION ON HOW TO CONTACT THE USPTO

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at **(703) 306-9165**. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

B. William Baumeister

Patent Examiner, Art Unit 2815

November 3, 2002



EDDIE LEE
SUPERVISORY PATENT EXAMINER
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